

IN THE CLAIMS:

1-10. (Canceled)

¹
2 ~~11~~. (Currently Amended) The method of claim ~~40~~ ²¹, wherein said physiological model is a mathematical model of said mammalian system comprising as operably linked components: (i) ~~differential~~ equations for calculating solubility and absorption of a test sample for one or more physiological segments of the mammal system of interest; and (ii) initial parameter values for the ~~differential~~ equations corresponding to physiological parameters and one or more selectively optimized adjustment parameters for one or more physiological segments of said mammal system of interest.

¹
3 ~~12~~. (Original) The method of claim ~~11~~, wherein said permeability data is derived from a cell-based assay.

³
4 ~~13~~. (Original) The method of claim ~~12~~, wherein said solubility and said dissolution rate data is derived from a chemical-based assay.

¹
5 ~~14~~. (Original) The method of claim ~~11~~, wherein said mammalian system of interest is selected from the group consisting of the gastrointestinal tract, the eye, the nose, the lung, the skin, and the brain.

6 ¹/₁₅. (Original) The method of claim ¹/₁, wherein said compound library is selected from the group consisting of a natural library, a synthetic library, and a combinatorial library.

7 ¹/₁₆. (Original) The method of claim ¹/₁, wherein said physiological model is for a mammalian system selected from the group consisting of gastrointestinal tract, eye, nose, lung, skin, and blood brain barrier.

17. (Canceled)

8 ¹/₁₈. (Currently Amended) The method of claim ¹/₁, which further comprises:
~~(iv) screening said secondary compound library by one or more~~ generating one or more predicted *in vivo* pharmacokinetic properties in addition to absorption; ~~(v) the absorption profile for the plurality of test samples;~~

selecting compounds by one or more of said ~~properties, and (vi) properties; and~~
producing one or more compound libraries characterized by absorption, and one or more of said properties.

9 ⁸/₁₉. (Original) The method of claim ⁸/₁₈, wherein said one or more properties in addition to absorption is selected from the group consisting of metabolism, toxicity and activity.

20. (Canceled)

21. (New) A method of screening a compound library or portion thereof by absorption, the method comprising:

providing a computer-implemented pharmacokinetic tool comprising an input/output system and a physiological model of a mammalian system of interest;

providing *in vitro* permeability and solubility data for a plurality of test samples from the compound library or portion thereof to the computer-implemented pharmacokinetic tool;

providing initial dose data to the computer-implemented pharmacokinetic tool;

generating a predicted *in vivo* absorption profile for each of the plurality of test samples with the computer-implemented pharmacokinetic tool; and

based on the generated absorption profiles, producing a secondary compound library comprising compounds having a desired absorption profile, whereby the compound library or portion thereof is screened by absorption.

22. (New) A method of screening a compound library or portion thereof by absorption, the method comprising:

providing a computer-implemented pharmacokinetic tool comprising an input/output system and a physiological model of a mammalian system of interest; the model comprises a selected adjustment parameter and the selected adjustment parameter comprises a value obtained by:

(i) assigning an initial value to the selected adjustment parameter;

(ii) inputting first data for a plurality of compounds into the model and running the model to generate output data;

(iii) comparing the output data with second data for the plurality of compounds;

(iv) selecting a new value for the selected adjustment parameter such that deviation of the comparison in step (iii) is reduced; and

(v) replacing the value of the selected adjustment parameter in the model with the new value selected in step (iv);

providing *in vitro* permeability and solubility data for a plurality of test samples from the compound library or portion thereof to the computer-implemented pharmacokinetic tool;

providing initial dose data to the computer-implemented pharmacokinetic tool;

generating a predicted *in vivo* absorption profile for each of the plurality of test samples with the computer-implemented pharmacokinetic tool; and

based on the generated absorption profiles, producing a secondary compound library comprising compounds having a desired absorption profile, whereby the compound library or portion thereof is screened by absorption.